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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,101	06/15/2001	Mark S. Andreaco	24017.02	8996

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EXAMINER
GABOR, OTILIA

ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 08/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/882,101	Applicant(s) ANDREACO ET AL.	
	Examiner Otilia Gabor	Art Unit 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Response to Amendment

1. The amendments filed 06/25/2003 have been entered.

Claim Rejections - 35 USC § 103

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-5, 9, 10-12, 15, 17-22, 24-29, 32-35, 41, 43-52, 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (U. S. Patent 5319204) and Berninger (U. S. Patent 3919556) and further in view of Engdahl (U. S. Patent 5753917).

Wong discloses an apparatus and method for position and energy determination of scintillation events caused by gamma rays when used in a variety of PET scanning systems, the apparatus comprising:

- a plurality of polished scintillation crystals 12 arranged in an array 16, where each array 16 may include a matrix of 8 x 8 crystals. The array is configured to occupy one quadrant of the adjacent array of

- photomultipliers 14 (14a-14d). The crystals 12 may be of any type (example BGO) and may be cut from a large block of scintillation material or can be formed from separate crystals.

When incident gamma rays interact with the scintillation elements a quantifiable number of scintillation photons are produced, the relative energies of which are recorded by the array of photomultipliers, the corresponding signals processed and analyzed, and the X and Y position coordinates of the scintillation event determined (i.e. the crystal in which the event occurred is determined). In this case (i.e., in the reference) the number of photomultiplier arrays (i.e. (p x q)) is less than the number of scintillation crystal arrays (m x n), however the conventional prior art techniques use one detector for every scintillation crystal and thus (p x q) equals (m x n).

Wong et al. fails to disclose a continuous light guide positioned between the scintillation elements and the photomultiplier, however one of ordinary skill in the art would have been motivated to use a continuous light guide since as Berninger shows having a continuous light guide 15 optically bonded with a glass plate 11a to the output face of the scintillator 11 and the photomultiplier tube array 12 will provide an optically transparent medium to satisfy the linearity and the position resolution of the gamma camera and will also provide a refractive index match between the scintillator and the detector, a feature necessary to decrease spurious light scattering.

Wong fails to disclose that the scintillator crystal is composed of two different layers having different decay times where a pulse shape discrimination technique is used to determine the layer in which the gamma event occurred.

Engdahl discloses a scintillating camera which, performs high and low energy imaging in conventional PET applications where the camera includes:

- a scintillation crystal 12 assembly having a first layer 14 of Thallium doped Sodium Iodide NaI(Ti) with a first decay constant and a second layer 16 of CsI(Na) with a slower decay constant
- a photomultiplier tube array 22 for detecting and localizing (x, y, z positions and energy) the scintillation events within the layers of the crystal
- a glass light guide 24 and
- detection circuitry 26 for detecting, discriminating (energy and pulse height), localizing and counting the scintillation events in the crystal 12. Incoming background rays are discriminated against on the basis of the signal amplitude.

One of ordinary skill in the art at the time the invention was made would have been motivated to use the scintillation crystal with multiple layers of Engdahl in the gamma camera of Wong since as Engdahl shows having a stacked layer configuration doubles the sensitivity of detecting a single photon when single photon imaging is used and quadruples the sensitivity of coincidence detection.

4. Claims 7, 8, 13, 14, 30, 31, 36, 37, 38, 42, 44, 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong and Berninger and Engdahl and further in view of Skillicorn et al. (U. S. Patent 6060713) and Roscoe et al. (U. S. Patent 5521378).

Wong fails to disclose that the scintillator elements are being composed of the

specific materials claimed, however as Skillicorn et al. shows the preferred scintillators in a nuclear imaging camera are the high-Z Cerium-doped Lutetium Oxyorthosilicate and Cerium-doped Yttrium Oxyorthosilicate scintillator elements and thus one of ordinary skill in the art at the time the invention was made would have been motivated to use either one, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Also, as Roscoe et al. shows scintillator materials such as Thallium-doped Sodium Iodide and Cerium-doped Gadolinium Oxyorthosilicate are commonly used in the art of gamma ray detection and thus one of ordinary skill in the art at the time the invention was made would have been motivated to use either one, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

5. Claims 16, 23, 39, 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong, Berninger and Engdahl and further in view of Moisan et al. (U. S. Patent 6087663).

Wong utilizes a non-active light guide in the imaging gamma camera and thus he fails to use an active light guide, however one of ordinary skill in the art at the time the invention was made would have been motivated to replace the non-active light guide with an active one since as Moisan et al. shows having active light guides capable of

encoding transverse and longitudinal coordinates of light emissions reduces the need of having separate scintillation elements and light guides connected to the detector array.

Response to Arguments

6. Applicant's arguments filed 06/25/2003 have been fully considered but they are not persuasive. The Applicant argues the following: 1) that there is no motivation to implement the light guide as disclosed by Berninger into the arrangement of Wong because there is no disclosure in Wong that its arrangement suffers from any of the shortcomings of Berninger and because the Berninger PMT tubes are shaped in a certain way that the PMTs of Wong are not, and 2) that since the Examiner has indicated that in the conventional art for every crystal there is a detector present and therefore the detector array (pxq) equals the scintillator crystal array (mxn) and thus the limitation of independent claim 41 is not present and thus it is allowable. These arguments are not persuasive because of the following: 1) The Berninger reference discloses a light guide 15 that solves the shortcomings of conventional optical couplings between scintillating crystals and photomultiplier tubes in the situation that the PMTs are not planar but curved. In the case that the photomultiplier tubes are planar, a planar guide between the crystals and the PMTs suffices (see Col.7, line 31-32), and in the case that the PMTs have a convex shape the light guide is shaped accordingly. Thus the Beringer reference merely establishes that conventional planar as well as curved light guides are well known and used in the art as optical couplings between the scintillating crystals and the PMTs. Since the arrangement of Wong discloses that there

is an optical coupling between the scintillating crystals and the PMTs (see Col.3, lines11-20) and since he does not go into details as to what specific coupling he uses, it can be assumed that any well known optical coupling is suitable. Since the Berninger reference establishes the existence and use of planar guides as optical couplings as well as curved guides for curved PMTs (in order to reduce the loss of light transmission that would occur when planar guide are used with curved PMTs), there is motivation to combine the references and to use the optical guide of Berninger with the Wong arrangement. 2) The Examiner did indicate that in a conventional arrangement the number of detector elements equals the number of scintillation crystals and thus (pxq) equals (mxn), but the Exmainer also indicated that the Wong reference uses LESS detector elements than scintillating crystals (see the rejection in detail, and Fig.7 and abstract), for as clearly shown in Figure 7 each PMT tube 14a, 14b, 14c detects radiation coming from four respective arrays of scintillating crystals. Thus though conventionally the numbers are equal, in Wong the number of detector array (pxq) is NOT equal to the number of scintillating crystals arrays (mxn).

Therefore, the claims still stand rejected as shown in detail above.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Otilia Gabor whose telephone number is 703-305-0384. The examiner can normally be reached on Monday-Friday between 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 703-308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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August 7, 2003

DAVID PORTA
SUPERVISORY PATENT EXAMINER
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